Claims:

1. Electrode-electrolyte pair comprising a porous electrode to the surface of which is deposited a multilayered solid electrolyte based on bismuth oxide with stabilizing additions, the solid electrolyte consisting of the inner nanoporous three-dimensional solid electrolyte layer of combined amorphous and crystalline structure which fills, at least partially, the surface pores of the microporous electrode to a depth of 2 – 50 μm, and a dense outer electrode layer of combined amorphous and crystalline structure located on the surface of said inner layer.

2. Electrode-electrolyte pair according to Claim 1, wherein said inner and outer electrolyte layers have similar or different compositions.

3. Electrode-electrolyte pair according to Claim 1, wherein said stabilizing additions of the solid electrolyte are yttrium and/or vanadium and/or molybdenum and/or zirconium and/or lead and/or tungsten and/or niobium and/or tantalum and/or chromium and/or cobalt and/or copper and/or alkaline earth metals and/or rare earth metals.

4. Electrode-electrolyte pair according to Claim 1, wherein said electrode has a flat or pipe-like shape.

5. Electrode-electrolyte pair according to Claim 1, wherein said electrode is made of a microporous ceramic or metallic or metalloceramic material with pore sizes of above 1 μm.

6. Electrode-electrolyte pair fabrication method comprising the formation, on the porous electrode surface, of a partially electrode-penetrating multilayered solid electrolyte based on bismuth oxide with stabilizing additions, to which end the porous electrode surface is initially impregnated with organogel consisting of particles of bismuth oxide with stabilizing additions and an organic solution containing organic salts of cerium and the stabilizing additions, and destruction of the organogel organic part that leads to the chemical deposition of the inner three-dimensional multilayered solid electrolyte layer on the electrode surface, following which the inner organogel layer is deposited onto the surface, said layer consisting of nanosized particles of bismuth oxide with stabilizing additions and an organic solution containing organic salts of bismuth and the stabilizing additions, and destruction of the organogel organic part that leads to the chemical deposition of the dense outer layer of the multilayered electrolyte onto the inner layer surface.

7. Method according to Claim 6, wherein said inner and outer electrolyte layers are produced using organogel of similar or different compositions.

8. Method according to Claim 6, wherein said stabilizing additions of the solid electrolyte are yttrium and/or vanadium and/or molybdenum and/or zirconium and/or lead and/or tungsten and/or niobium and/or tantalum and/or chromium and/or cobalt and/or copper and/or alkaline earth metals and/or rare earth metals.

9. Method according to Claim 6, wherein the impregnation of said porous electrode surface with organogel is performed in vacuum of by mechanical pressing the organogel into the porous electrode surface.

10. Method according to Claim 6, wherein said organogel destruction is performed with high-rate pyrolysis at temperatures within 600°C in an oxidizing, inert or weakly reducing gas atmosphere.

11. Method according to Claim 10, wherein organogel organic part destruction is performed simultaneously or sequentially with the impregnation or organogel deposition onto the inner layer surface.

12. Method according to Claim 10, wherein during organogel impregnation of the electrode or organogel deposition to the inner layer surface with simultaneous destruction, the organogel is deposited to the surface to be coated by spraying or printing.

13. Method according to Claim 10, wherein during organogel impregnation of the electrode or organogel deposition to the inner layer surface with subsequent destruction, the organogel is deposited to the cold surface of the electrode or the inner layer with subsequent high-rate heating of the electrode.

14. Method according to Claim 6, wherein organogel impregnation of the electrode or organogel deposition to the inner layer surface and organogel destruction are performed in one or multiple stages.

15. Organogel used for the fabrication of the electrode-electrolyte pair contains nanosized particles of bismuth oxide with stabilizing additions and an organic solution containing organic salts of bismuth and the stabilizing metals, a mixture of α-branching carbonic acids with the general formula $H(CH_2\text{-}CH_2)_nCR'R''\text{-}COOH$, where R' is CH_3, R" is $C_mH_{(m+1)}$ and m is from 2 to 6, with an average molecular weight of 140-250.

16. Organogel according to Claim 14, wherein said stabilizing additions are yttrium and/or vanadium and/or molybdenum and/or zirconium and/or lead and/or tung-

sten and/or niobium and/or tantalum and/or chromium and/or cobalt and/or copper and/or alkaline earth metals and/or rare earth metals.

17. Organogel according to Claim 15, wherein said organic solvent is a mixture of α-branching carbonic acids with the general formula $H(CH_2\text{-}CH_2)_nCR'R''\text{-}COOH$, where R' is CH_3, R'' is $C_mH_{(m+1)}$ and m is from 2 to 6, with an average molecular weight of 140-250, or carbonic acid and/or any organic solvent of carbonic acid metal salts.

18. Organogel according to Claim 15, wherein said organogel contains nanosized particles 5 nm to 3 μm in size.

19. Organogel according to Claim 15, wherein the concentration of stabilizing additions in bismuth and metal salts in the organogel is selected at 0.05 to 1 mole/l in a ratio corresponding to the electrolyte stoichiometric composition.

20. Organogel according to Claim 15, wherein the volume ratio of the nanosized particles in the organogel is within 5 to 45%.